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09/927,017	08/09/2001	Andrew Riddle	P24,262-B USA	4149

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EXAMINER
FOWLKES, ANDRE R

ART UNIT	PAPER NUMBER
2122	

Stephen J. Weed
Synnestvedt & Lechner LLP
2600 Aramark Tower
1101 Market Street
Philadelphia, PA 19107-2950

DATE MAILED: 09/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/927,017	RIDDLE ET AL.	
	Examiner	Art Unit	
	Andre R. Fowlkes	2122	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 August 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *8/9/01* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-15 are pending.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1 and 5-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Nosenchuck, U.S. Patent No. 5,442,790.

As per claim 1, Nosenchuck discloses a **method for optimizing a computer program,** (col. 3:5-9, "revising the WIC statements (i.e. computer program) in the block in accordance with one of a group of code transform algorithms and heuristics in an attempt to improve the code's performance"), **said method comprising the steps of:**

-generating a plurality of intermediate software optimizations based on the computer program (col. 2:68-3:13, "performing an initial approximate simulation of each WIC statement in a block and deriving performance results from the simulation of each WIC statement and the block of WIC statements; dependent upon the performance results, revising the WIC statements (i.e. generating another intermediate software optimization) in the block in accordance with one of a group of code transform

algorithms and heuristics in an attempt to improve the code's performance; and repeating the approximate simulation to determine if the performance results have been improved and, if so, proceeding to another of the algorithms to enable further revision of the WIC statements, until a decision point is reached, and at such time, producing the revised WIC statements in object code form."),

evaluating each of said plurality of intermediate software optimizations based on at least one optimization objective (col. 3:8-10, "repeating the approximate simulation to determine if the performance results have been improved (i.e. evaluating each intermediate software optimization)"),

- **selecting a final software optimization from said plurality of intermediate software optimizations based on results of said evaluating step** (col. 3:10-13, "proceeding to another of the algorithms to enable further revision of the WIC statements, until a decision point is reached, and at such time, producing the revised WIC statements in object code form"),

- **transforming said final software optimization into an optimized computer program** (col. 3:10-13, "proceeding to another of the algorithms to enable further revision of the WIC statements, until a decision point is reached, and at such time, producing the revised WIC statements in object code form").

As per claim 5, the rejection of claim 1 is incorporated, and further Nosenchuck discloses that said generating step comprises the steps of:

- selecting an existing intermediate software optimization from said plurality of intermediate software optimizations (col. 2:68-3:4, "performing an initial approximate simulation of each WIC statement (i.e. selected software optimization) in a block and deriving performance results from the simulation of each WIC statement and the block of WIC statements"),

- identifying coding substitutions to apply to said existing intermediate software optimization (col. 3:5-8, "revising the WIC statements (i.e. generating another intermediate software optimization) in the block in accordance with one of a group of code transform algorithms and heuristics in an attempt to improve the code's performance"),

- selecting one of said identified coding substitutions (col. 3:5-8, "revising the WIC statements (i.e. generating another intermediate software optimization) in the block in accordance with one of a group of code transform algorithms and heuristics in an attempt to improve the code's performance"),

- applying said selected one of said identified coding substitutions to a copy of said selected existing intermediate software optimization to create a new intermediate software optimization (col. 3:5-8, "revising the WIC statements (i.e. applying the selected intermediate software optimization) in the block in accordance with one of a group of code transform algorithms and heuristics in an attempt to improve the code's performance").

As per claim 6, the rejection of claim 5 is incorporated, and further Nosenchuck discloses that **said selecting steps each comprise the step of applying a searching algorithm** (col. 3:5-8, "revising the WIC statements in accordance with one of a group of code transform algorithms and heuristics (i.e. one of the optimization algorithms is chosen, based on an algorithm) in an attempt to improve the code's performance").

As per claim 7, the rejection of claim 1 is incorporated, and further Nosenchuck discloses **receiving said at least one optimization objective from an operator** (col. 2:68-3:6, "performing an initial approximate simulation of each WIC statement in a block and deriving performance results from the simulation ... dependent upon the performance results, revising the WIC statements (i.e. generating another intermediate software optimization)", and the operator inputs and measures the optimization objective with the simulator).

As per claim 8, the rejection of claim 1 is incorporated, and further Nosenchuck discloses that **at least one optimization objective is one or more optimization objectives selected from a group consisting of minimizing execution time, minimizing code size, and minimizing runtime memory consumption** (col. 1:68-69, "measuring codes performance against performance metrics (i.e. optimization objectives)", and minimizing execution time and code size are common optimization objectives).

As per claim 9, the rejection of claim 1 is incorporated, and further Nosenchuck discloses that **said selecting step comprises selecting the intermediate software optimization from said plurality of intermediate software optimizations having the highest evaluation** (col. 3:10-13, "proceeding to another of the algorithms to enable further revision of the WIC statements, until a decision point is reached (i.e. the intermediate s/w optimization with the highest evaluation is selected), and at such time, producing the revised WIC statements in object code form").

As per claims 10-15, Nosenchuck also discloses such claimed limitations as addressed in claims 1 and 5 above.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 2-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nosenchuck, U.S. Patent No. 5,442,790 in view of Isozaki, U.S. Patent No. 5,586,020.

As per claim 2, the rejection of claim 1 is incorporated, and further Nosenchuck doesn't explicitly discloses that **said plurality of intermediate software optimizations are software optimization graphs.**

However, Isozaki, in an analogous environment, discloses that **said plurality of intermediate software optimizations are software optimization graphs** (col. 2:36-41, "In the global data-flow analysis, the intermediate codes are read out from the intermediate file, are divided into basic blocks which is a unit, all statements included in which are continuously executed. Then, information concerning a flow of control for the processing execution is added to a set of basic blocks thus prepared, so that a flow graph (i.e. software optimization graph) is generated").

Therefore, it would have been obvious to a person of ordinary skill in the art, at the time the invention was made, to incorporate the teachings of Isozaki into the system of Nosenchuck to have intermediate software optimizations represented ad software optimization graphs. The modification would have been obvious because one of ordinary skill in the art would have wanted to use a useful, well-known technique to express and optimize the intermediate representation of the software.

As per claim 3, the rejection of claim is incorporated, and further Nosenchuck discloses that said generating step comprises the steps of:

- substituting instructions of the computer program with binary code (col. 3:12-13, "producing the revised WIC statements (instructions of the computer program) in object code form"),

- **generating said plurality of software optimizations** (col. 2:68-3:13, "performing an initial approximate simulation of each WIC statement in a block and deriving performance results from the simulation of each WIC statement and the block of WIC statements; dependent upon the performance results, revising the WIC statements (i.e. generating another intermediate software optimization) in the block in accordance with one of a group of code transform algorithms and heuristics").

Nosenchuck doesn't explicitly discloses that said generating step comprises the steps of:

- **parsing said binary code into a software representation graph;**

- generating said plurality of software optimization **graphs based on said software representation graph.**

However, Isozaki, in an analogous environment, discloses that said generating step comprises the steps of:

- **parsing said binary code into a software representation graph** (col. 2:36-41, "In the global data-flow analysis, the intermediate codes are read out from the intermediate file, are divided into basic blocks which is a unit, all statements included in which are continuously executed. Then, information concerning a flow of control for the processing execution is added to a set of basic blocks thus prepared, so that a flow graph (i.e. software optimization graph) is generated"),

- generating said plurality of software optimization **graphs based on said software representation graph** (col. 2:36-41, "In the global data-flow analysis, the intermediate codes are read out from the intermediate file, are divided into basic blocks

which is a unit, all statements included in which are continuously executed. Then, information concerning a flow of control for the processing execution is added to a set of basic blocks thus prepared, so that a flow graph (i.e. software optimization graph) is generated").

Therefore, it would have been obvious to a person of ordinary skill in the art, at the time the invention was made, to incorporate the teachings of Isozaki into the system of Nosenchuck to have software and optimizations represented in graph form. The modification would have been obvious because one of ordinary skill in the art would have wanted to use a useful, well-known technique to express and optimize the software.

As per claim 4, Nosenchuck discloses that said generating step comprises the steps of:

- selecting an existing intermediate software optimization from said plurality of intermediate software optimizations (col. 2:68-3:4, "performing an initial approximate simulation of each WIC statement (i.e. selected software optimization) in a block and deriving performance results from the simulation of each WIC statement and the block of WIC statements"),

- identifying coding substitutions to apply to said existing intermediate software optimization (col. 3:5-8, "revising the WIC statements (i.e. generating another intermediate software optimization) in the block in accordance with one of a

group of code transform algorithms and heuristics in an attempt to improve the code's performance"),

- selecting one of said identified coding substitutions (col. 3:5-8, "revising the WIC statements (i.e. generating another intermediate software optimization) in the block in accordance with one of a group of code transform algorithms and heuristics in an attempt to improve the code's performance"),

- applying said selected one of said identified coding substitutions to a copy of said selected existing intermediate software optimization to create a new intermediate software optimization (col. 3:5-8, "revising the WIC statements (i.e. applying the selected intermediate software optimization) in the block in accordance with one of a group of code transform algorithms and heuristics in an attempt to improve the code's performance").

Nosenchuck doesn't explicitly disclose that the software optimizations are software optimization **graphs.**

However, Isozaki, discloses performing optimization using **software optimization graphs**, (col. 2:36-41, "In the global data-flow analysis, the intermediate codes are read out from the intermediate file, are divided into basic blocks which is a unit, all statements included in which are continuously executed. Then, information concerning a flow of control for the processing execution is added to a set of basic blocks thus prepared, so that a flow graph (i.e. software optimization graph) is generated").

Therefore, it would have been obvious to a person of ordinary skill in the art, at the time the invention was made, to incorporate the teachings of Isozaki into the system of Nosenchuck to perform optimization using software optimization graphs. The modification would have been obvious because one of ordinary skill in the art would have wanted to use a useful, well-known technique to express and optimize the intermediate representation of the software.

Conclusion

After October 25, 2004, the examiner can be reached at new telephone number (571) 272-3697, and the examiner's supervisor, Tuan Q. Dam can be reached on (571) 272-3695.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andre R. Fowlkes whose telephone number is (703)305-8889. The examiner can normally be reached on Monday - Friday, 8:00am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tuan Q. Dam can be reached on (703)305-4552. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ARF

TUAN DAM
SUPERVISORY PATENT EXAMINER